



SEQUENCE LISTING

<110> Bidney, Dennis
Duvick, John
Hendrick, Carol
Hu, Xu
Lu, Guihua
Crasta, Oswald

<120> Sunflower RhoGAP, LOX, ADH and SCIP -
Polynucleotides and Methods of Use

<130> 35718/201902

<140> 09/714,767

<141> 2000-11-16

<150> US 60/166,128

<151> 1999-11-18

<150> US 60/201,837

<151> 2000-05-03

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TECH CENTER 1600/2900

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Arg Ser Val Tyr Asp Ala Ile Pro Met Thr Val Lys Gln Tyr Leu Glu	
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gcg gtt tac ttt gtt cat ccg gat ctg cag tcc aga att ttt ctg gct	391
Ala Val Tyr Phe Val His Pro Asp Leu Gln Ser Arg Ile Phe Leu Ala	
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Phe Val Ser Arg Leu Ala Tyr Leu Trp Glu His Val Lys Arg Asn Glu	
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atc gag atc cca gag ttt gtc tac gat cat gat gag gat ctg gag tac	535
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Arg Pro Met Met Asp Tyr Gly Ile Glu Ser Asp His Ala Arg Val Tyr	
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Ile Ser	
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Phe Pro Gly Ile Ser Val Leu Arg Ser Val Tyr Asp Ala Ile Pro Met	
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Thr Val Lys Gln Tyr Leu Glu Ala Val Tyr Phe Val His Pro Asp Leu	
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Gln Ser Arg Ile Phe Leu Ala Thr Phe Gly Arg Leu Ile Phe Thr Gly	
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Gly Leu Tyr Ala Lys Leu Arg Phe Val Ser Arg Leu Ala Tyr Leu Trp
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 Glu His Val Lys Arg Asn Glu Ile Glu Ile Pro Glu Phe Val Tyr Asp
 145 150 155 160
 His Asp Glu Asp Leu Glu Tyr Arg Pro Met Met Asp Tyr Gly Ile Glu
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 45 50 55
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 Thr Ala Gly Asn Ile Lys Ala Ile Ser Ile Pro Phe Leu Thr Lys Glu
 60 65 70 75
 acc acc gtc aag tgt gtc atc acc gtc caa cca acc att agt tcc gcc 291
 Thr Thr Val Lys Cys Val Ile Thr Val Gln Pro Thr Ile Ser Ser Ala
 80 85 90
 att gct ggt gta ggc gtt ggt ggt att gtt gat ggt gtt tct gat ctt 339
 Ile Ala Gly Val Gly Val Gly Gly Ile Val Asp Gly Val Ser Asp Leu
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 Leu Gly Leu Ser Phe Leu Leu Glu Leu Val Ser Asn Asp Leu Asp Ser
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 aaa gga aac caa aag aca gtg aag gct tat gca aga tac aac gca ctg 435
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Asn Gly Ile Leu Ser Ala Leu Pro Arg Leu Val Lys Gly Ala Thr Asp	
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Ala Ala Asn Thr Val Ile Lys Phe Glu Thr Pro Glu Thr Ile Asp Arg	
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Ala Gly Ile Asn Pro Cys Arg Ile Gln Leu Val Thr Glu Trp Pro Leu	
415 420 425	
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Met Ser Lys Leu Asp Pro Glu Ile Tyr Gly Pro Ala Glu Ser Ala Ile	
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Lys His Val Tyr Thr Pro Ala Trp Asp Ala Thr Gly Ala Trp Leu Trp	
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Leu Val Ser His Trp Leu Arg Thr His Cys Ala Thr Glu Pro Tyr Ile	
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Val Glu Ser Asp Glu Glu Leu Gln Ala Trp Trp Asn Glu Ile Arg Thr	
700 705 710 715	
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735 740 745	
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Ser Gly Gln His Ser Ala Val Asn Phe Gly Gln Tyr Asp Phe Ala Gly	
750 755 760	
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Asp Pro Thr Asp Glu Glu Trp Gln Ser Phe Ile Lys Arg Pro Glu Asp	
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895

900

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 Asp Glu Asp Phe Ser Glu Ile Lys Ser Val Asn Phe Gly Ala Lys Thr
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 Tyr Asn Glu Gly Val Asn Val Pro Ser Pro Asp Asn Gly Ile Leu Ser
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 Ile Lys Phe Glu Thr Pro Glu Thr Ile Asp Arg Asp Ala Phe Ser Trp
 385 390 395 400

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Thr Arg Pro Pro Val Asp Gly Lys Pro Gln Trp Lys His Val Tyr Thr
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His Val Leu Ala His Asp Ser Ser Tyr His Gln Leu Val Ser His Trp
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Gln Leu Ser Gln Met His Pro Ile Arg Arg Phe Leu Leu Pro His Phe
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Thr Ala Pro Tyr Gly Val Lys Leu Thr Ile Glu Asp Tyr Pro Tyr Ala
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675 680 685
Tyr Val Asn His Tyr Tyr Pro Pro Ala Asn Leu Val Glu Ser Asp Glu
690 695 700
Glu Leu Gln Ala Trp Trp Asn Glu Ile Arg Thr Val Gly His Gly Asp
705 710 715 720
Lys Lys Asp Glu Pro Trp Trp Pro Gln Leu Lys Thr Gln Asp Asp Leu
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Ile Gly Ile Val Ser Thr Ile Leu Trp Val Thr Ser Gly Gln His Ser
740 745 750
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755 760 765
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785 790 795 800
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820 825 830
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850 855 860
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 Met Ser Ser Thr Thr Gly Gln Val Ile Arg Cys
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 Lys Ala Ala Val Thr Trp Glu Ala Gly Lys Pro Leu Val Ile Glu Glu

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caa aat cct gta ttc cca aga att tta gga cat gaa gct gga ggg gtt Gln Asn Pro Val Phe Pro Arg Ile Leu Gly His Glu Ala Gly Gly Val 65 70 75			301
gtg gag agt gtt ggg gaa gga gtg act gat ctt cag cca ggg gat cat Val Glu Ser Val Gly Glu Gly Val Thr Asp Leu Gln Pro Gly Asp His 80 85 90			349
gtt ctt ccc gtt ttc acc gga gaa tgc aaa gag tgt gct cac tgt aag Val Leu Pro Val Phe Thr Gly Glu Cys Lys Glu Cys Ala His Cys Lys 95 100 105			397
tcc gaa gag agc aac atg tgt gac ctt ctc agg atc aac acc gac agg Ser Glu Glu Ser Asn Met Cys Asp Leu Leu Arg Ile Asn Thr Asp Arg 110 115 120			445
gga gtc atg ctt cac gat cag aaa tct cga ttc tcg atc aac ggc aaa Gly Val Met Leu His Asp Gln Lys Ser Arg Phe Ser Ile Asn Gly Lys 125 130 135 140			493
ccc atc ttc cat ttt gtg ggg act tct act ttc agc gag tac acg gtt Pro Ile Phe His Phe Val Gly Thr Ser Thr Phe Ser Glu Tyr Thr Val 145 150 155			541
gtt cat gtt gga tgt ctt gca aag atc aac cct ctt gcc cct ctt gat Val His Val Gly Cys Leu Ala Lys Ile Asn Pro Leu Ala Pro Leu Asp 160 165 170			589
aaa gtt tgt gtt ctc agc tgt ggg atc tcc aca ggg ctg ggt gct act Lys Val Cys Val Leu Ser Cys Gly Ile Ser Thr Gly Leu Gly Ala Thr 175 180 185			637
ttg aat gtt gca aaa ccg aaa aaa ggc tct tcg gtg gcg gtt ttc ggt Leu Asn Val Ala Lys Pro Lys Lys Gly Ser Ser Val Ala Val Phe Gly 190 195 200			685
ctg ggg gca gtg gga ctt gct gct gct gaa ggt gca aga att tct ggg Leu Gly Ala Val Gly Leu Ala Ala Ala Glu Gly Ala Arg Ile Ser Gly 205 210 215 220			733
gct tca aga atc att ggt gtt gat ctc aat gcc aat aga ttc gag ctt Ala Ser Arg Ile Ile Gly Val Asp Leu Asn Ala Asn Arg Phe Glu Leu 225 230 235			781
gca aag aaa ttt ggg gtt aca gag ttt gtg aac cca aaa gat tat aag Ala Lys Lys Phe Gly Val Thr Glu Phe Val Asn Pro Lys Asp Tyr Lys 240 245 250			829
aag ccg gtg caa gaa gtg att gca gag atg aca aat gga gga gtt gac Lys Pro Val Gln Glu Val Ile Ala Glu Met Thr Asn Gly Gly Val Asp 255 260 265			877
agg agt gtt gaa tgc act ggt cat att gat gct atg atc tct gct ttt			925

Arg Ser Val Glu Cys Thr Gly His Ile Asp Ala Met Ile Ser Ala Phe
 270 275 280

gaa tgt gtt cat gat ggg tgg ggt gtt gct gtt cta gta ggt gtt ccg 973
 Glu Cys Val His Asp Gly Trp Gly Val Ala Val Leu Val Gly Val Pro
 285 290 295 300

cat aaa gat gcc gtg ttc aag acc agt ccc atg aat ctg ttg aac gaa 1021
 His Lys Asp Ala Val Phe Lys Thr Ser Pro Met Asn Leu Leu Asn Glu
 305 310 315

agg act ctg aag ggt acc ttc ttt gga aac tat aaa ccg cga tct gat 1069
 Arg Thr Leu Lys Gly Thr Phe Phe Gly Asn Tyr Lys Pro Arg Ser Asp
 320 325 330

att cct tcg gtt gtc gaa aag tat atg aac aag gaa ctt gag gtg gag 1117
 Ile Pro Ser Val Val Glu Lys Tyr Met Asn Lys Glu Leu Glu Val Glu
 335 340 345

aag ttc ata aca cat gaa gtg cca ttt tca gag atc aat aag ccc ttt 1165
 Lys Phe Ile Thr His Glu Val Pro Phe Ser Glu Ile Asn Lys Pro Phe
 350 355 360

gac ttg atg ctt aaa ggt gaa ggt ctt cgt tgc att att cga atg gat 1213
 Asp Leu Met Leu Lys Gly Glu Gly Leu Arg Cys Ile Ile Arg Met Asp
 365 370 375 380

gcc taaataattt caaactgtgc aagagagagc agtaggagtc gtctattcgt 1266
 Ala

aaagatatat gtgtgtgttc tcgtctctca tcgtcgtaaa tgtgtcctta agatcttggt 1326
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<211> 381

<212> PRT

<213> Helianthus annuus ADH

<400> 7

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 20 25 30
 Pro Pro Gln Lys Met Glu Val Arg Ile Lys Ile Leu Phe Thr Ser Leu
 35 40 45
 Cys His Thr Asp Val Tyr Phe Trp Glu Ala Lys Gly Gln Asn Pro Val
 50 55 60
 Phe Pro Arg Ile Leu Gly His Glu Ala Gly Gly Val Val Glu Ser Val
 65 70 75 80
 Gly Glu Gly Val Thr Asp Leu Gln Pro Gly Asp His Val Leu Pro Val
 85 90 95
 Phe Thr Gly Glu Cys Lys Glu Cys Ala His Cys Lys Ser Glu Glu Ser
 100 105 110
 Asn Met Cys Asp Leu Leu Arg Ile Asn Thr Asp Arg Gly Val Met Leu
 115 120 125
 His Asp Gln Lys Ser Arg Phe Ser Ile Asn Gly Lys Pro Ile Phe His
 130 135 140
 Phe Val Gly Thr Ser Thr Phe Ser Glu Tyr Thr Val Val His Val Gly
 145 150 155 160
 Cys Leu Ala Lys Ile Asn Pro Leu Ala Pro Leu Asp Lys Val Cys Val
 165 170 175

Leu Ser Cys Gly Ile Ser Thr Gly Leu Gly Ala Thr Leu Asn Val Ala
 180 185 190
 Lys Pro Lys Lys Gly Ser Ser Val Ala Val Phe Gly Leu Gly Ala Val
 195 200 205
 Gly Leu Ala Ala Ala Glu Gly Ala Arg Ile Ser Gly Ala Ser Arg Ile
 210 215 220
 Ile Gly Val Asp Leu Asn Ala Asn Arg Phe Glu Leu Ala Lys Lys Phe
 225 230 235 240
 Gly Val Thr Glu Phe Val Asn Pro Lys Asp Tyr Lys Lys Pro Val Gln
 245 250 255
 Glu Val Ile Ala Glu Met Thr Asn Gly Gly Val Asp Arg Ser Val Glu
 260 265 270
 Cys Thr Gly His Ile Asp Ala Met Ile Ser Ala Phe Glu Cys Val His
 275 280 285
 Asp Gly Trp Gly Val Ala Val Leu Val Gly Val Pro His Lys Asp Ala
 290 295 300
 Val Phe Lys Thr Ser Pro Met Asn Leu Leu Asn Glu Arg Thr Leu Lys
 305 310 315 320
 Gly Thr Phe Phe Gly Asn Tyr Lys Pro Arg Ser Asp Ile Pro Ser Val
 325 330 335
 Val Glu Lys Tyr Met Asn Lys Glu Leu Glu Val Glu Lys Phe Ile Thr
 340 345 350
 His Glu Val Pro Phe Ser Glu Ile Asn Lys Pro Phe Asp Leu Met Leu
 355 360 365
 Lys Gly Glu Gly Leu Arg Cys Ile Ile Arg Met Asp Ala
 370 375 380

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<220>
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 Met Ala Asn Ala Ser Asp Glu Phe Arg Leu Ala Ser
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 tcc ggc atc gat cat gaa ggc cga cta cca cga aaa tac acc ggt gac 98
 Ser Gly Ile Asp His Glu Gly Arg Leu Pro Arg Lys Tyr Thr Gly Asp
 15 20 25
 ggt caa ggt aca aaa aaa gac ata tca cca ccg tta gaa tgg tac aac 146
 Gly Gln Gly Thr Lys Lys Asp Ile Ser Pro Pro Leu Glu Trp Tyr Asn
 30 35 40
 gtt ccg gag ggg aca aaa aca cta gca cta gtg gtg gag gac atc gat 194
 Val Pro Glu Gly Thr Lys Thr Leu Ala Leu Val Val Glu Asp Ile Asp
 45 50 55 60
 gca ccg gac cca gaa gcg ccg ctg gtt ccg tgg act gtg tgg gtg gtg 242
 Ala Pro Asp Pro Glu Ala Pro Leu Val Pro Trp Thr Val Trp Val Val
 65 70 75
 gtc aat ata cca cct act ttg aag ggg ctc cca gag gga ttt tcc ggg 290

Val Asn Ile Pro Pro Thr Leu Lys Gly Leu Pro Glu Gly Phe Ser Gly	
80 85 90	
aaa gag ggg gac atg ggt ggc gat tat gct aat gtt aaa gaa gga cat	338
Lys Glu Gly Asp Met Gly Gly Asp Tyr Ala Asn Val Lys Glu Gly His	
95 100 105	
aat gac ttt aag gtg cct gga tgg cgc gca ccg aag atg ccc tca tcc	386
Asn Asp Phe Lys Val Pro Gly Trp Arg Ala Pro Lys Met Pro Ser Ser	
110 115 120	
gga cac cgg ttc gag ttt aag ctg tat gcg ttg gat gaa caa gtt gag	434
Gly His Arg Phe Glu Phe Lys Leu Tyr Ala Leu Asp Glu Gln Val Glu	
125 130 135 140	
ttg ggg aat aag gtg act aag gag aag ttg ctg gag gcg att gat ggc	482
Leu Gly Asn Lys Val Thr Lys Glu Lys Leu Leu Glu Ala Ile Asp Gly	
145 150 155	
cat gtg gtt ggg gag gct gtt ctg atg gcc gta aat taaattgaga	528
His Val Val Gly Glu Ala Val Leu Met Ala Val Asn	
160 165	
atggtttata tatatgtag ttgtgtgact tgtgtcatgt gtgatgttct tgttttaacg	588
tattttgaaa cagaagtgc gagagagaga gagggtttgt tgtgtgtttt tcttgagaga	648
tcgtgaatta attatgctgt ttgcttcaa ggaatcaagc tttataaagt aaaatacaaa	708
tgtaatgctt caaccgagct aaaaaaaaaa aaaaaaaaaa	747

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 <212> PRT
 <213> Helianthus annus SCIP-1

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 His Glu Gly Arg Leu Pro Arg Lys Tyr Thr Gly Asp Gly Gln Gly Thr
 20 25 30
 Lys Lys Asp Ile Ser Pro Pro Leu Glu Trp Tyr Asn Val Pro Glu Gly
 35 40 45
 Thr Lys Thr Leu Ala Leu Val Val Glu Asp Ile Asp Ala Pro Asp Pro
 50 55 60
 Glu Ala Pro Leu Val Pro Trp Thr Val Trp Val Val Val Asn Ile Pro
 65 70 75 80
 Pro Thr Leu Lys Gly Leu Pro Glu Gly Phe Ser Gly Lys Glu Gly Asp
 85 90 95
 Met Gly Gly Asp Tyr Ala Asn Val Lys Glu Gly His Asn Asp Phe Lys
 100 105 110
 Val Pro Gly Trp Arg Ala Pro Lys Met Pro Ser Ser Gly His Arg Phe
 115 120 125
 Glu Phe Lys Leu Tyr Ala Leu Asp Glu Gln Val Glu Leu Gly Asn Lys
 130 135 140
 Val Thr Lys Glu Lys Leu Leu Glu Ala Ile Asp Gly His Val Val Gly
 145 150 155 160
 Glu Ala Val Leu Met Ala Val Asn
 165

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<221> misc_feature
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 ccgaaccact ttgccgctgc cactccgggc agcctaaata atgctatata tgtgacattt 120
 ttgcactgaa ttctactttt tatttaccat acgcgatgaa aaggcatttg tttttatta 180
 tattatattt cagtttctat ttttgacgg caaaaatgaa ttttattaaa agtaaacgaa 240
 tttaaaaata ttcggataat tactttttct tttgaatcct gattcggata agttggtacg 300
 aattttaaaa cgacaattga ttgaaaatga gtgatgtagc tctttctagc gtaccacgta 360
 tctgtcaagt gtcaacatgc tacagcttct caaaactgct agaactctta actacacgtg 420
 tccacaaacc cacaaaatcc taaccatcca taacactata agaacttgat caacagatct 480
 gtttagtaac aagttattga aggtacaaca atg 513